

surfaces of the first and second shells and has a greater thickness dimension or higher modulus of elasticity than the first shell. An electrochemical battery cell, such as a flat liquid electrolyte battery, is provided in the battery enclosure. Electronic circuitry, supported on a flexible wiring substrate, which is electrically coupled to the electrochemical battery cell and a medical electrical lead, is provided between the inner surface of the second shell and the cover of the battery enclosure. A hermetic seal is provided between the cover of the battery enclosure and the applicable portion of the first shell.

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The deformable housing assembly is further defined by a feedthrough assembly, which couples the battery to the electronic circuitry. The feedthrough assembly is disposed within a hermetically sealed aperture of the cover and includes a ferrule and a feedthrough pin that are isolated from one another.

The electrochemical battery cell is further defined to include a lithium anode, a cathode with  $\text{Li/CSVO/CF}_x$  chemistry and a liquid electrolyte of type  $1\text{M LiBF}_4$  in GBL/DME.

The hermetic seal provided between the cover of the battery enclosure and the first shell is preferably a weld joint. In one embodiment, the battery enclosure cover includes a coined edge and the hermetic seal is established by a butt weld joint between the coined edge of the cover and a peripheral edge of the first shell.

According to another embodiment of the present invention, a housing assembly for an implantable medical device includes a housing comprising a first shell and a second shell, with the outer surfaces of the first and second shells including a material compatible with body fluids. The first shell includes a spanked edge. A battery enclosure is defined by a cover and at least a portion of the first shell of the IMD housing. The cover of the battery enclosure is situated between the inner surfaces of the first and second shells, has a greater thickness dimension or higher modulus of elasticity than the first shell, and includes a peripheral edge. A hermetic seal, according to this embodiment, is established by a spank weld joint between the peripheral edge of the cover and the spanked edge of the first shell.

The first shell may further include a first substantially straight peripheral wall portion and a second substantially straight peripheral wall portion adjacent to the first portion and offset from the first portion to form a ledge, which the peripheral edge of the cover engages. The hermetic seal is established by a spank weld joint between the peripheral edge of the cover and the spanked edge of the first shell.

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According to yet another embodiment, the cover may also include a substantially straight peripheral wall portion. The hermetic seal is established by a standing edge weld joint between the substantially straight peripheral wall portion of the cover and the substantially straight peripheral wall portion of the first shell.

The present invention is also directed towards a method for assembling a battery into a housing assembly for an IMD including the following steps: providing a shallow drawn case; providing a battery cover having a greater thickness or higher modulus of elasticity than the case; coupling a cathode to the cover; glassing a feedthrough assembly having a feedthrough tube disposed within a ferrule to electrically isolate the feedthrough tube from the ferrule and to bond the feedthrough tube to the ferrule; hermetically sealing the ferrule of the feedthrough assembly to the cover; coupling a feedthrough pin to an anode current collector; placing an insulator tube over the feedthrough; placing the cover over the anode current collector while directing the feedthrough pin through the feedthrough tube; coupling the feedthrough pin to the feedthrough tube; and hermetically sealing the cover to the case.

The above summary of the present invention is not intended to describe each embodiment or every implementation of the present invention. Advantages and attainments, together with a more complete understanding of the invention, will become apparent and appreciated by referring to the following detailed description and claims taken in conjunction with the accompanying drawings.

Please replace lines 19-30 on page 6 with the following:

Figures 5A-E are illustrations of a hermetically-sealed IMD battery housing according to another embodiment of the present invention;

Figures 6A-E illustrate another embodiment of a hermetically-sealed IMD battery housing of the present invention;

Figures 7-9 illustrate various embodiments of weld joints for hermetically sealing an IMD battery housing of the present invention;

Figures 10A-D illustrate various showings of a feedthrough in accordance with one embodiment of the present invention;

Figures 11A-D illustrate another embodiment of a feedthrough according to the present invention;

Figures 12A-D illustrate various views of a complete implantable medical device employing a flat battery in accordance with an embodiment of the present invention;

Please replace the sentence of lines 12-15 on page 9, with the following:

Figure 2 illustrates an implantable medical device 21, such as an implantable pulse generator (IPG), which incorporates an integral battery housing for containing a flat liquid electrolyte battery in accordance with the principles of the present invention.

Please replace the sentence of lines 27-28 on page 18 with the following:

The feedthrough assembly 30 is also welded to the cover 22 of the battery housing.

Please replace the sentence of lines 4-6 on page 19 with the following:

For example, the alumina insulator 55 bonds to the glass 52 and to the tube 56, thus creating a line of sight insulation between the feedthrough tube 57 and the ferrule 50.

Please replace the sentence of line 30 on page 19 with the following:

The feedthrough pin 58 may be constructed from Nb, Ti, Mo, or Ta.

Please delete the bolded, bracketed text of lines 5-7 on page 25.

Figures 4, 11A, 11B, 12, and 12A are corrected per enclosed redline figures.

Please replace the abstract of the disclosure on page 37 with the following:

A body implantable medical device (IMD) includes a first shell and a second shell whose outer surfaces are biocompatible. The IMD further includes a battery enclosure defined by a cover and all or a portion of the first shell of the IMD housing. The cover of the battery enclosure is disposed between the inner surfaces of the first and second shells and has a greater rigidity than the first shell. An electrochemical cell, such as a flat liquid electrolyte battery, is provided in the battery enclosure. Electronic circuitry, supported on a flexible wiring substrate, is provided between the inner surface of the second shell and the cover of the battery enclosure. A hermetic seal is provided between the cover of the battery enclosure and all or a portion of the first shell. The hermetic seal is preferably a weld joint, such as a butt, spank or standing edge weld joint.

In the claims:

Please **CANCEL** claims 2-13, 15, 16, 18, 19, 21-24, 26, and 27 without prejudice or disclaimer of the subject matter contained therein.

Please **AMEND** the claims as follows:

1. (Amended) A selectively deformable housing assembly for an implantable medical device, comprising:  
a housing comprising a first shell and a second shell, the first and second shells comprising an inner surface and an outer surface, respectively, the outer